204.2 - Optical Properties

See also: Table 204.1 - Molecular Absorption (film, filter, solid, and solution forms)

For wavelength reference SRMs see: Table 207.4 Optoelectronics (solid forms)

SRM 936a has been discontinued. SRM 2943 Relative Intensity Correction Standard for Fluorescence Spectroscopy: Blue Emission can be used as an alternative for applications using a cuvette-type sample format. See Table 204.2 (below) for related materials.

For further information see SP 260-64.

Specular Spectral Reflectance - These SRMs are for calibrating the reflectance scale of integrating sphere reflectometers used to evaluate materials for solar energy collectors and to calibrate reflectometers used in evaluating the appearance of polished metals and metal-plated objects.

SRMs 2011, 2013, 2015, 2017 and 2021 are now being supported by Calibration Service (Service No. 38060S). Click here for further information: http://www.nist.gov/calibrations/

For further information see SP 260-79 and SP 260-75.

Infrared Reflectance (solid form)
Optical Rotation (powder form) - SRM 17f is intended for calibrating or checking polarimetric apparatus. In aqueous solution, the optical rotation of SRM 17f is value assigned at four wavelengths.

Photography (chart form) - SRM 1010a is used to test the resolving power of cameras or of whole microcopying systems. It consists of 5 charts printed photographically on paper, that have 26 high-contrast, 5-line patterns ranging in spatial frequency of 1 mm^{-1} to 18 mm^{-1}.

Liquid Refractive Index -Mineral Oil SRM 1922 is intended for use as a calibration material for refractometers, specifically for the refractive index range applicable to solutions of sugar and water. SRM 1922 is a mineral oil characterized for refractive index in the visible light range, and consists of one bottle of approximately 30 mL of liquid. Certified values of refractive index were conducted on a precision goniometer using the classical method of minimum deviation. Certified values are given for the refractive indices at six wavelengths, at 20 °C, and for the change in *n* with respect to temperature, dn/dT valid over the temperature range from 15 °C to 35 °C. The refractive index corresponds to approximately 71.6 on the Brix scale.

SRM	Description	Unit Size
17f	Sucrose Optical Rotation	60 g
1010a	Microcopy Resolution Test Charts	set (5)
1922	Liquid Refractive Index - Mineral Oil	30 mL
1932	Fluorescein Solution	3 x 2 mL
2036	Near Infrared Wavelength/Wavenumber Reflection Standard	each
2241	Relative Intensity Correction Standard for Raman Spectroscopy: 785 nm Excitation	each
2242	Relative Intensity Correction Standard for Raman Spectroscopy: 532 nm Excitation	each
2244	Relative Intensity Correction Standard for Raman Spectroscopy: 1064 nm Excitation	each
2245	Relative Intensity Correction Standard for Raman Spectroscopy: 633 nm Excitation	each
2246	Relative Intensity Correction Standard for Raman Spectroscopy: 830 nm Excitation	each
2940	Relative Intensity Correction Standard for Fluorescence Spectroscopy: Orange Emission	each(12.5 x 12.5 x 45)mm
2941	Relative Intensity Correction Standard for Fluorescence Spectroscopy: Green Emission	each(12.5 x 12.5 x 45)mm
2942	Relative Intensity Correction Standard for Fluorescence Spectroscopy: Ultraviolet Emission	each(12.5 x 12.5 x 45)mm
2943	Relative Intensity Correction Standard for Fluorescence Spectroscopy: Blue Emission	each(12.5 x 12.5 x 45)mm
2944	Relative Intensity Correction Standard for Fluorescence Spectroscopy: Red Emission	each(12.5 x 12.5 x 45)mm

- Certified values are normal font
- Reference values are italicized
- Values in parentheses are for information only

204.2 - Optical Properties

See also: Table 204.1 - Molecular Absorption (film, filter, solid, and solution forms)

For wavelength reference SRMs see: Table 207.4 Optoelectronics (solid forms)

SRM 936a has been discontinued. SRM 2943 Relative Intensity Correction Standard for Fluorescence Spectroscopy: Blue Emission can be used as an alternative for applications using a cuvette-type sample format. See Table 204.2 (below) for related materials.

For further information see SP 260-64.

Specular Spectral Reflectance - These SRMs are for calibrating the reflectance scale of integrating sphere reflectometers used to evaluate materials for solar energy collectors and to calibrate reflectometers used in evaluating the appearance of polished metals and metal-plated objects.

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For further information see SP 260-79 and SP 260-75.

Infrared Reflectance (solid form)
Optical Rotation (powder form) - SRM 17f is intended for calibrating or checking polarimetric apparatus. In aqueous solution, the optical rotation of SRM 17f is value assigned at four wavelengths.

Photography (chart form) - SRM 1010a is used to test the resolving power of cameras or of whole microcopying systems. It consists of 5 charts printed photographically on paper, that have 26 high-contrast, 5-line patterns ranging in spatial frequency of 1 mm^{-1} to 18 mm^{-1}.

Liquid Refractive Index -Mineral Oil SRM 1922 is intended for use as a calibration material for refractometers, specifically for the refractive index range applicable to solutions of sugar and water. SRM 1922 is a mineral oil characterized for refractive index in the visible light range, and consists of one bottle of approximately 30 mL of liquid. Certified values of refractive index were conducted on a precision goniometer using the classical method of minimum deviation. Certified values are given for the refractive indices at six wavelengths, at 20 °C, and for the change in *n* with respect to temperature, dn/dT valid over the temperature range from 15 °C to 35 °C. The refractive index corresponds to approximately 71.6 on the Brix scale.

204.2(1)- Fluorescence and Raman Spectroscopy

SRM	Description	Unit Size	Wavelength Range (nm)
1932	Fluorescein Solution	3 x 2 mL	488 to 491
2241	Relative Intensity Correction Standard for Raman Spectroscopy: 785 nm Excitation	each	785
2242	Relative Intensity Correction Standard for Raman Spectroscopy: 532 nm Excitation	each	532
2244	Relative Intensity Correction Standard for Raman Spectroscopy: 1064 nm Excitation	each	1064
2245	Relative Intensity Correction Standard for Raman Spectroscopy: 633 nm Excitation	each	632.8
2246	Relative Intensity Correction Standard for Raman Spectroscopy: 830 nm Excitation	each	830
2940	Relative Intensity Correction Standard for Fluorescence Spectroscopy: Orange Emission	each(12.5 x 12.5 x 45)mm	500 to 800
2941	Relative Intensity Correction Standard for Fluorescence Spectroscopy: Green Emission	each(12.5 x 12.5 x 45)mm	450 to 650
2942	Relative Intensity Correction Standard for Fluorescence Spectroscopy: Ultraviolet Emission	each(12.5 x 12.5 x 45)mm	320 to 430
2943	Relative Intensity Correction Standard for Fluorescence Spectroscopy: Blue Emission	each(12.5 x 12.5 x 45)mm	350 to 640
2944	Relative Intensity Correction Standard for Fluorescence Spectroscopy: Red Emission	each(12.5 x 12.5 x 45)mm	530 to 830

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204.2 - Optical Properties

See also: Table 204.1 - Molecular Absorption (film, filter, solid, and solution forms)

For wavelength reference SRMs see: Table 207.4 Optoelectronics (solid forms)

SRM 936a has been discontinued. SRM 2943 Relative Intensity Correction Standard for Fluorescence Spectroscopy: Blue Emission can be used as an alternative for applications using a cuvette-type sample format. See Table 204.2 (below) for related materials.

For further information see SP 260-64

Specular Spectral Reflectance - These SRMs are for calibrating the reflectance scale of integrating sphere reflectometers used to evaluate materials for solar energy collectors and to calibrate reflectometers used in evaluating the appearance of polished metals and metal-plated objects.

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For further information see SP 260-79 and SP 260-75.

Infrared Reflectance (solid form)
Optical Rotation (powder form) - SRM 17f is intended for calibrating or checking polarimetric apparatus. In aqueous solution, the optical rotation of SRM 17f is value assigned at four wavelengths.

Photography (chart form) - SRM 1010a is used to test the resolving power of cameras or of whole microcopying systems. It consists of 5 charts printed photographically on paper, that have 26 high-contrast, 5-line patterns ranging in spatial frequency of 1 mm^{-1} to 18 mm^{-1}.

Liquid Refractive Index -Mineral Oil SRM 1922 is intended for use as a calibration material for refractometers, specifically for the refractive index range applicable to solutions of sugar and water. SRM 1922 is a mineral oil characterized for refractive index in the visible light range, and consists of one bottle of approximately 30 mL of liquid. Certified values of refractive index were conducted on a precision goniometer using the classical method of minimum deviation. Certified values are given for the refractive indices at six wavelengths, at 20 °C, and for the change in *n* with respect to temperature, dn/dT valid over the temperature range from 15 °C to 35 °C. The refractive index corresponds to approximately 71.6 on the Brix scale.

204.2(3)- Infrared Reflectance (solid form)

Infrared Reflectance (solid form)

SRM	Description	Unit Size	Wavelength Range (nm)
2036	Near Infrared Wavelength/Wavenumber Reflection Standard	each	975 to 1946

- Certified values are normal font
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204.2 - Optical Properties

See also: Table 204.1 - Molecular Absorption (film, filter, solid, and solution forms)

For wavelength reference SRMs see: Table 207.4 Optoelectronics (solid forms)

SRM 936a has been discontinued. SRM 2943 Relative Intensity Correction Standard for Fluorescence Spectroscopy: Blue Emission can be used as an alternative for applications using a cuvette-type sample format. See Table 204.2 (below) for related materials.

For further information see SP 260-64

Specular Spectral Reflectance - These SRMs are for calibrating the reflectance scale of integrating sphere reflectometers used to evaluate materials for solar energy collectors and to calibrate reflectometers used in evaluating the appearance of polished metals and metal-plated objects.

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For further information see SP 260-79 and SP 260-75

Infrared Reflectance (solid form)
Optical Rotation (powder form) - SRM 17f is intended for calibrating or checking polarimetric apparatus. In aqueous solution, the optical rotation of SRM 17f is value assigned at four wavelengths.

Photography (chart form) - SRM 1010a is used to test the resolving power of cameras or of whole microcopying systems. It consists of 5 charts printed photographically on paper, that have 26 high-contrast, 5-line patterns ranging in spatial frequency of 1 mm^{-1} to 18 mm^{-1}.

Liquid Refractive Index -Mineral Oil SRM 1922 is intended for use as a calibration material for refractometers, specifically for the refractive index range applicable to solutions of sugar and water. SRM 1922 is a mineral oil characterized for refractive index in the visible light range, and consists of one bottle of approximately 30 mL of liquid. Certified values of refractive index were conducted on a precision goniometer using the classical method of minimum deviation. Certified values are given for the refractive indices at six wavelengths, at 20 °C, and for the change in *n* with respect to temperature, dn/dT valid over the temperature range from 15 °C to 35 °C. The refractive index corresponds to approximately 71.6 on the Brix scale.

204.2(4)- Optical Rotation (powder form)

			Optical Rotation (in mrad) 3/4 Aqueous Solution Wavelength (100 mm cell)			
SRM	**Description**	**Unit Size**	**546.2271 nm**	**589.4400 nm**	**632.9914 nm**	**882.60 nm**
17f	Sucrose Optical Rotation	60 g	*355.68*	*302.03*	*259.51*	*129.41*

- Certified values are normal font
- Reference values are italicized
- Values in parentheses are for information only

204.2 - Optical Properties

See also: Table 204.1 - Molecular Absorption (film, filter, solid, and solution forms)

For wavelength reference SRMs see: Table 207.4 Optoelectronics (solid forms)

SRM 936a has been discontinued. SRM 2943 Relative Intensity Correction Standard for Fluorescence Spectroscopy: Blue Emission can be used as an alternative for applications using a cuvette-type sample format. See Table 204.2 (below) for related materials.

For further information see SP 260-64.

Specular Spectral Reflectance - These SRMs are for calibrating the reflectance scale of integrating sphere reflectometers used to evaluate materials for solar energy collectors and to calibrate reflectometers used in evaluating the appearance of polished metals and metal-plated objects.

SRMs 2011, 2013, 2015, 2017 and 2021 are now being supported by Calibration Service (Service No. 38060S). Click here for further information: http://www.nist.gov/calibrations/

For further information see SP 260-79 and SP 260-75.

Infrared Reflectance (solid form)
Optical Rotation (powder form) - SRM 17f is intended for calibrating or checking polarimetric apparatus. In aqueous solution, the optical rotation of SRM 17f is value assigned at four wavelengths.

Photography (chart form) - SRM 1010a is used to test the resolving power of cameras or of whole microcopying systems. It consists of 5 charts printed photographically on paper, that have 26 high-contrast, 5-line patterns ranging in spatial frequency of 1 mm^{-1} to 18 mm^{-1}.

Liquid Refractive Index -Mineral Oil SRM 1922 is intended for use as a calibration material for refractometers, specifically for the refractive index range applicable to solutions of sugar and water. SRM 1922 is a mineral oil characterized for refractive index in the visible light range, and consists of one bottle of approximately 30 mL of liquid. Certified values of refractive index were conducted on a precision goniometer using the classical method of minimum deviation. Certified values are given for the refractive indices at six wavelengths, at 20 °C, and for the change in *n* with respect to temperature, dn/dT valid over the temperature range from 15 °C to 35 °C. The refractive index corresponds to approximately 71.6 on the Brix scale.

204.2(5)- Optical Rotation

			Optical Rotation (in mrad)Aqueous Solution Wavelength (200 mm cell)			
SRM	**Description**	**Unit Size**	**546.2271 nm**	**589.4400 nm**	**632.9914 nm**	**882.60 nm**
17f	Sucrose Optical Rotation	60 g	*711.36*	*604.06*	*519.02*	*258.81*

- Certified values are normal font
- Reference values are italicized
- Values in parentheses are for information only

204.2 - Optical Properties

See also: Table 204.1 - Molecular Absorption (film, filter, solid, and solution forms)

For wavelength reference SRMs see: Table 207.4 Optoelectronics (solid forms)

SRM 936a has been discontinued. SRM 2943 Relative Intensity Correction Standard for Fluorescence Spectroscopy: Blue Emission can be used as an alternative for applications using a cuvette-type sample format. See Table 204.2 (below) for related materials.

For further information see SP 260-64

Specular Spectral Reflectance - These SRMs are for calibrating the reflectance scale of integrating sphere reflectometers used to evaluate materials for solar energy collectors and to calibrate reflectometers used in evaluating the appearance of polished metals and metal-plated objects.

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For further information see SP 260-79 and SP 260-75.

Infrared Reflectance (solid form)
Optical Rotation (powder form) - SRM 17f is intended for calibrating or checking polarimetric apparatus. In aqueous solution, the optical rotation of SRM 17f is value assigned at four wavelengths.

Photography (chart form) - SRM 1010a is used to test the resolving power of cameras or of whole microcopying systems. It consists of 5 charts printed photographically on paper, that have 26 high-contrast, 5-line patterns ranging in spatial frequency of 1 mm^{-1} to 18 mm^{-1}.

Liquid Refractive Index -Mineral Oil SRM 1922 is intended for use as a calibration material for refractometers, specifically for the refractive index range applicable to solutions of sugar and water. SRM 1922 is a mineral oil characterized for refractive index in the visible light range, and consists of one bottle of approximately 30 mL of liquid. Certified values of refractive index were conducted on a precision goniometer using the classical method of minimum deviation. Certified values are given for the refractive indices at six wavelengths, at 20 °C, and for the change in *n* with respect to temperature, dn/dT valid over the temperature range from 15 °C to 35 °C. The refractive index corresponds to approximately 71.6 on the Brix scale.

204.2(6)- Photography (chart form)

SRM	Description	Unit Size
1010a	Microcopy Resolution Test Charts	set (5)

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See also: Table 204.1 - Molecular Absorption (film, filter, solid, and solution forms)

For wavelength reference SRMs see: Table 207.4 Optoelectronics (solid forms)

SRM 936a has been discontinued. SRM 2943 Relative Intensity Correction Standard for Fluorescence Spectroscopy: Blue Emission can be used as an alternative for applications using a cuvette-type sample format. See Table 204.2 (below) for related materials.

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Specular Spectral Reflectance - These SRMs are for calibrating the reflectance scale of integrating sphere reflectometers used to evaluate materials for solar energy collectors and to calibrate reflectometers used in evaluating the appearance of polished metals and metal-plated objects.

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Infrared Reflectance (solid form)
Optical Rotation (powder form) - SRM 17f is intended for calibrating or checking polarimetric apparatus. In aqueous solution, the optical rotation of SRM 17f is value assigned at four wavelengths.

Photography (chart form) - SRM 1010a is used to test the resolving power of cameras or of whole microcopying systems. It consists of 5 charts printed photographically on paper, that have 26 high-contrast, 5-line patterns ranging in spatial frequency of 1 mm^{-1} to 18 mm^{-1}.

Liquid Refractive Index -Mineral Oil SRM 1922 is intended for use as a calibration material for refractometers, specifically for the refractive index range applicable to solutions of sugar and water. SRM 1922 is a mineral oil characterized for refractive index in the visible light range, and consists of one bottle of approximately 30 mL of liquid. Certified values of refractive index were conducted on a precision goniometer using the classical method of minimum deviation. Certified values are given for the refractive indices at six wavelengths, at 20 °C, and for the change in *n* with respect to temperature, dn/dT valid over the temperature range from 15 °C to 35 °C. The refractive index corresponds to approximately 71.6 on the Brix scale.

204.2(7)- Liquid Refractive Index - Mineral Oil

SRM	Description	Unit Size	*n* (at °20 C)	dn/dT °C^{-1}	Wavelength (nm)
1922	Liquid Refractive Index - Mineral Oil	30 mL	$1.47685 \pm 2x10^{-5}$	$-3.74x10^{-4} \pm 3x10^{-6}$	467.8
			$1.47583 \pm 3x10^{-5}$	$-3.74x10^{-4} \pm 3x10^{-6}$	480.0
			$1.47373 \pm 2x10^{-5}$	$-3.74x10^{-4} \pm 3x10^{-6}$	508.6
			$1.47149 \pm 2x10^{-5}$	$-3.74x10^{-4} \pm 3x10^{-6}$	546.1
			$1.46945 \pm 6x10^{-5}$	$-3.74x10^{-4} \pm 3x10^{-6}$	589.3
			$1.46744 \pm 2x10^{-5}$	$-3.74x10^{-4} \pm 3x10^{-6}$	643.8

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